TECHNICAL SPECIFICATION FOR MANUAL CALL POINTS

Owner : **M/s Indian Oil Corporation Limited (IOCL) – Paradip Refinery**

Consultant/PMC : M/s TECHNIP ENERGIES LIMITED

Purchaser / LSTK Contractor : M/s Bharat Heavy Electricals Limited (BHEL)

Engineering Sub-Contractor : M/s Engineers India Limited (EIL)

Site : Paradip Refinery, Paradip, Odisha, India

Revisions: Refer to record of revisions	Prepared By:	Checked By :	Approved :	Date :
	Raviteja J	D V Prashant Kumar	P Chandra Sekhar	11.03.2022

1.0 SCOPE

This technical specification covers the Design, Engineering, Manufacturing, Assembly, testing at vendor works, inspection by purchaser, packing and transportation to site with necessary documentation like data sheets, statutory approvals, O&M manuals etc., as required and supervision of Erection, commissioning of Manual Call Points.

2.0 INSTRUCTIONS TO BIDDERS

1.1 Bidders are advised to contact BHEL for essential technical queries in writing within one week of issue of Enquiry. Offers with incomplete information will not be considered for evaluation, and are likely to be rejected outright without any further interaction with the Bidder.

1.2 Unsolicited requests from bidders for alterations to their already submitted offer will not be entertained. These would not be taken cognizance, and offers will be evaluated without taking into account such requests/correspondence.

1.3 Any technical features over & above BHEL enquiry specification requirements proposed by Bidder will not be given preference for the purpose of evaluation.

1.4 Bidders are advised to comply to specifications in total, unless the requirement is not feasible. **In case feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder.**

1.5 In the event of any conflict between these specifications, data sheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for clarifications and only after obtaining the same shall proceed with the manufacture of the items in question.

1.6 Bidder shall submit duly filled deviation format given in elsewhere in this specification.

3.0 List of Annexures (To followed along with this specification)

Document No.	Document Name
Annexure – [A]	Price bid format
Annexure – [B]	B366-088-16-50-40250 Rev.0 – Specification for Fire Alarm System
Annexure – [C]	Add on technical requirements
Annexure – [D]	Vendor list
Annexure – [E]	Quality Requirements
Annexure – [F]	Installation drawing for Manual Call Points
Annexure – [G]	080557C-000-ITP-1500-001 Rev.B – ITP for Instrumentation

4.0 STANDARDS: As per annexure-[B] & annexure-[C] of this specification.

5.0 TECHNICAL REQUIREMENTS: As per annexure-[B] & annexure-[C] of this specification.

6.0 Manual Call Points BOM and Price format: As per Annexure-[A] of this specification.

7.0 Mandatory spares: As per enquiry & Annexure-[A] of this specification.

8.0 DOCUMENTATION

Note: All drawings/documents shall be prepared on computer and prints taken on laser printer. Drawing / document size shall be preferably limited to 'A4' size.

10.1 Information to be included with Offer:

Vendor shall make the offer in detail, with respect to every item of the Purchaser's specifications. Any offer not conforming to this shall be summarily rejected.

a) Bill of material
b) Copy of BHEL specification duly stamped & signed by vendor as a total compliance
c) Technical catalogue.
d) Proven Track record and reference list

e) Unpriced price schedule (To be submitted compulsorily without fail)
f) Deviation list, if any (to mention nil – if not applicable).
g) Duly filled & signed copy of checklist

10.2 Documentation submission within 2 weeks of placement of LOI (for approval by BHEL and / or BHEL's customer in 4 sets)

a) Consolidated BOM sheet along with accessories of instruments, finalized make /models of instruments, etc for approval.
b) Detail GA drawings
c) Type tests, statutory certificates
d) Comprehensive Quality Assurance plan (QAP).
e) Filled – up technical data sheets for each instrument along with applicable tag list.

Notes:

a) BHEL Shall provide the following inputs to vendor immediately (within 7 calendar days) after placement P.O. / LOI:
   1. Typical cover page along with document title, document numbers, Logos, etc. This is to be used for all instruments with necessary modification for each variety of instrument.

b) Following points to be noted while submitting drgs & data sheets for approval:
   1. Each instrument data sheet to be submitted along with cover page & tag list.
   2. All extra quantities to be marked as "C.spares (commissioning spares)".
   3. All data sheets & drgs to be submitted in soft copy first and once it is cleared for manufacturing, then same shall be submitted in spiral hard copies for formal approval. Do not submit drgs/data sheets in loose papers as well as in bits & pieces for approval.
   4. All vendor documents of instruments covered in this specification and its sub-items shall be submitted to Engg consultant / Customer / Consultant for approval during order execution (if applicable). Any comment furnished by Engg consultant / Customer / Consultant / BHEL shall be taken care by vendor during ordering execution.
   5. Further BHEL will provide comments on vendor submitted document within 14 calendar days for revision & resubmission. Vendor shall follow up with BHEL for non-receipt of comments/approvals.
   6. Revised drawings / Documents shall be submitted by Bidder in 07 calendar days of receipt of comments / observations from BHEL. BHEL shall revert within 14 calendar days on receipt of these revised documents / drawings from vendor for approvals.
   7. All the approvals required for manufacturing shall be completed within 2 months from P.O to meet the P.O delivery schedule. Accordingly, vendor shall ensure the submission of approval category documents (which are required for manufacturing) and obtain their approvals.
   8. Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates.
   9. It is vendor's responsibility to obtain approvals from BHEL as earliest as possible to meet PO delivery schedules. Accordingly, vendor to plan and execute the supplies in time.

10.3 Documents to be submitted during final shop testing & before equipment dispatch. (16 sets)

(Note: 2 sets to be included with item dispatch and balance to BHEL purchase department and **submission of these documents is commercially linked**)

a) All documents approved by BHEL.
b) Complete O&M manual - 2 sets to be included with item dispatch and balance to BHEL purchase department).

c) Material test certificates. In case of pipes made from plates, Test certificates as per standard ANSI B36.10 shall be submitted with plate material

d) Inspection report
e) Guarantee and all test certificates for review and acceptance by BHEL and/or BHEL's customer.
f) As shipped documents.
g) As built documents.

3 sets of CD-ROM – containing **O&M manual and Engineering documents** (1 set to be included with item dispatch and balance to BHEL purchase department).

All documents shall be addressed to BHEL- Purchase section.

9.0 INSPECTION AND TESTING: As per annexure-[G] of this specification.

10.0 PACKING & DISPATCH

12.1 All items shall be marked (stamped/etched) in accordance with the applicable code/standard/specification. In addition, the item code, if available, shall also be marked.

12.2 For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard.

12.3 Part number/Dispatch link-up of all the equipment's/items supplied and also their co-relation with system/drawing/approved BOQ.

12.4 Paint or ink for marking shall not contain any harmful metal or metal salts which can cause corrosive attack either ordinarily or in service. Special items/smaller items shall have attached corrosion resistant tag providing salient features.

12.5 The equipment shall be transported to site by the vendor in fully assembled condition. However, in case some components are liable to be damaged during transit, the same shall be dismantled and supplied separately, to be reassembled at site by the vendor. Assembly of the item supplied loose at site and repairing of any item damaged during transport shall be in the vendor's scope. The vendor shall send each consignment to site with a detailed packing list.

12.6 All the equipment shall be divided into several sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by ship/rail or trailer. The equipment shall be wrapped in polythene sheets before being placed in wooden crates/cases to prevent damage to the finish. Wooden Crates/cases shall have skid bottom for handling.

12.7 Special notations such as 'Fragile', 'This side up', 'Center of gravity', 'Weight', 'Owner's particulars', 'PO Nos.' etc. shall be clearly marked on the package together with other details as per purchaser order.

12.8 The equipment/items may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains/high ambient temperature, unless otherwise agreed.

12.9 The following minimum packing procedures shall be followed: -

a) All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kinds.
b) All items shall be protected from rust, corrosion, and mechanical damage during transportation and handling.
c) Each variety and size of item shall be supplied in separate packaging marked with the purchase order no., item code (if available), and the salient specifications.
d) All electrical, instrumentation etc., shall be properly packed to prevent damage during transport, storage, handling at site.
e) All the items which the Bidders considered liable to be damaged during shipment or storage, shall be packaged for separate shipment. If instruments are removed from the panel, they and their connection shall be suitably tagged to ensure simple re installation at the job site. Each instrument shall be sealed in plastic bags containing moisture absorbing desiccants

f) It shall be bidder's sole responsibility to protect all the material during packing, dispatch, storage and erection against corrosion, incidental damage due to vermin, sunlight, rain, high temperature, humid atmosphere, rough handling in transit and including delays in transit.

g) Mandatory Spare parts shall be packaged separately and clearly marked as 'Mandatory Spares '.

h) Commissioning spares, Tools & tackles to be packed separately & suitably tagged.

12.10 If mandatory spare items are ordered, same shall be sent in pre-decided lots in wooden containers /secure boxes distinctly marked in GREEN color with boldly written "S "mark on each face of the wooden containers /secure boxes

12.11 Loose vendor items sent by vendor to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items.

12.12 A packing list covering items having shelf life are to be intimated to site. Also, shelf life items shall be packed separately in black color painted box for easy identification at site.

12.13 In case of imported/exported items, seaworthy packing shall be done as per specification no: AA0490004 (latest revision) and the type of packing applicable for wedge flow element is "CQ". This specification shall be obtained by vendor on request.

11.0 DEFECT LIABILITY PERIOD/WARRANTY:

The Defect Liability Period / warranty shall be as per commercial terms & conditions of the NIT.

CHECK LIST

(To be filled by BIDDER and submitted along with Technical offer is compulsorily)

Vendor shall submit the following documents mandatorily as part of COMPLTE technical offer.

Enquiry No. / Date :

Name of the Bidder :

Project Name :

Item Description :

S. No	Document	Bidder confirmation (Yes/No)	Remarks
1	Technical offer complies with the specifications and its associated annexures, pre-bid clarifications in Toto and there are no technical deviations. Signed and stamped copy of this specification along with annexures enclosed along with technical offer.		
2	In case of deviation, vendor to confirm that these are technically not feasible deviations and same are submitted in **BHEL format.** In case technically feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder		
3	All items are manufactured conforming to latest version of material grade standard and manufacturing standard mentioned in this specifications		
4	**Bidder to quote as per BHEL price format only. No other format is acceptable.** Bidder to attach un-priced price bid format by indicating "QUOTED" against each item and submit with technical offer duly signed & stamped.		
5	For addition/reduction of quantity, unit rate quoted in the present offer shall be considered during ordering and shall be valid up to execution of the contract to the extent of + 10% and -30% of order Value.		
6	Bidder to agree that Bill of materials / list of equipment furnished in the offer is only for information; Vendor shall supply all the material to meet the performance, sizing & technical requirement as per specification & its Annexures, scope matrix etc.		
7	All the equipments / items / etc., supplied by bidder are having valid statutory approval certificates and same will be produced at any stage of contract execution to BHEL. The same were eligible to take local statutory regulatory body approval during commissioning of the system		
8	Confirm that the quote includes commissioning spares, special tool & tackles, mounting hardware/ accessories, terminations, etc. as required for commissioning activities.		

(Bidder's Signature and stamp with date)

DEVIATION FORMAT

Enquiry No.:

Item:

Name of Bidder:

Offer Ref. No.:

Sl. No.	Clause no. & Spec. no.	Description as per Specification	Deviation taken	Nature of Deviation	Remarks

NOTES:

1. **Technical offer of the bidder will be evaluated only on the basis of Deviation Schedule. Deviation Schedule constitutes this sheet (with these Notes) duly signed and stamped.**
2. Deviations, if any, shall be clearly brought out only in this format. Deviations mentioned / taken elsewhere or in any other format will be ignored.
3. Additional sheets in the same format can be attached by the vendor, if necessary.
4. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
5. No price implications shall be entertained for deviations withdrawn during the technical scrutiny. If any deviations are accepted by BHEL during technical scrutiny, then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
6. Reasons for the deviations shall be specified in the Remarks column.
7. If there are no deviations from the specifications, bidder still has to submit the Deviation Schedule by writing "NO Deviations" in this format.
8. If the "Deviation Schedule" is not submitted along with the offer, the bidder's offer is likely to be rejected without any further interaction with the bidder.
9. Only the accepted deviations in conjunction with the original tender shall constitute the contract document for the award of job to the bidder.

SIGNATURE OF BIDDER _____

NAME _____

DESIGNATION _____

COMPANY SEAL

DATE _____

RECORD OF REVISIONS

Rev. No.	Date	Revision Details	Revised By	Approved By
00	11.03.2022	Original issue	----------	P Chandra Sekhar

PRICE SCHEDULE for
(Manual Call Points)

SECTION - 1: Common Notes

1	This document details the price schedule for the enquiry. Bidder shall fill up in this format only. No other format will be entertained. No cognizance will be taken of any changes made by vendor with respect to format issued by BHEL in the description of any item in price format.
2a	Duly signed & stamped unpriced price schedule format shall be submitted by vendor as a token of their concurrence that the price schedule is submitted in this format. If not submitted in this format or any field is left blank, the offer will be liable for rejection.
2b	All the blank fields shall be filled irrespective of applicability of any item for this Project. If any item is not in bidder's manufacturing range or not available in market (for bought-outs) then "Not Applicable/NA" shall be mentioned in the field. If the bidder mentions "Not Applicable/ NA" against any item and if need arises during order execution for such item, then the same shall be supplied free of cost. If any item is left unfilled, it shall be deemed that the price is included in any of the other quoted items / package and hence, price will be considered as zero for evaluation/additions. Also, for such items, unit rates for deletions will be at the discretion of BHEL.
3	Vendor shall fill up prices of various items and submit to BHEL in separate sealed cover as commercial offer. All prices shall be submitted as ex-works. Applicable taxes and duties shall also be indicated separately.
4	The format contains FOUR sections:
4a	Section-1: Common Notes
4b	Section-2: Price Schedule for Main Equipment for Manual Call Points
4c	Section-3: Deleted
4d	Section-4: Price Schedule for the Recommended Spares of Manual Call Points
5	Tender evaluation priority / criteria shall be as per the Landed cost to BHEL based on Grand Total in Section-2. However, in case of any mis-match in values quoted by the bidder, final decision will be at the discretion of BHEL.
6	Components/ Items/ Spares shall be identical to the main equipment.
7	Billing & Payments will be as per final approved BOM.
8	All rates of Section-2 shall be valid up to execution of the contract and handing over to end user.
9	BHEL reserves the right to order part quantity or short close if any item/main equipment is not needed during execution.
10	Under Price Format Section-4, bidder to provide list of 2-Years Recommended O&M spares for Manual Call Points along with unit price of each item. BHEL reserves the right to order full/partial quantity of the Recommended O & M Spares along with the main equipment or separately or not at all. The Price shall be valid until expiry of warranty period.

PROJECT: **STANDBY SRU (525 TPD)**	*ANNEXURE-[A] TO PY 51817* *(Section-2)*
CUSTOMER: **IOCL, PARADIP**	
BHEL ENQUIRY NO.: _____	
BIDDER: _____	

PRICE SCHEDULE for
(Manual Call Points)

S/N	ITEM	Material Code	Quantity	Units	UNIT PRICE INCLUDING P&F AND FREIGHT (INR)	TOTAL PRICE INCLUDING P&F AND FREIGHT	REMARKS	WEIGHTAGE
1	Manual Call Points with Mounting/Erection material (Main Supply)	PY9751817013	7	No's				*87.50%*
2	Manual Call Points with Mounting/Erection material (Mandatory Spares)	PY9751817013	1	No's				*12.50%*

GRAND TOTAL (FOR Item No.1&2 L1 EVALUATION) ::

Note 1 Unit means 1 No. or 1 Set or 1 Visit or 1 Day. Accordingly Unit Prices shall be quoted.

Note 2 This includes the price of Commissioning Spares, consumables, O&M Manuals, As-Manufactured Drawings, As-Built Drawings, Lugs and Glands for the entire Manual Call Points

Signature & Seal of Bidder:
Date:

PROJECT: **STANDBY SRU (525 TPD)**	*ANNEXURE-[A] TO PY 51817* *(Section-4)*
CUSTOMER: **IOCL, PARADIP**	*Rev No. 00*
BHEL ENQUIRY NO.:	*PRICE OFFER NO.:*
BIDDER:	*DATE:*

PRICE SCHEDULE for MANUAL CALL POINTS
(RECOMMENDED SPARES)

SECTION - 4: Price Schedule of Optional 2-Years Recommended Spares for Manual Call Points

S/N	DESCRIPTION	QUANTITY	UNIT PRICE (EX-WORKS IN INR)	TOTAL PRICE (EX-WORKS IN INR)

Note 1	Two Years spares (O & M Spares) - Parts or assemblies normally used or consumed on the basis of scheduled maintenance, overhauls, inspections, wear, corrosion, erosion or deterioration in normal service for a period of TWO years beyond the Defect Liability Period as recommended by manufacturers of various equipment (other than commissioning and mandatory required during the Defect Liability Period). Vendors will be requested to quote for their recommended two years' operation and maintenance spares but these spares will not be considered for price evaluation. These will be selected and ordered by IOCL separately. Broad Guidelines for selection of the same include: • Key operation and safety functions of the equipment. • Current delivery time and transportation time to site of items not stocked. • Possibility of damage during installation and commissioning. • Expected normal wear and tear during first TWO years of operation. • Service interval stated by Manufacturers maintenance policy • Possible repair/exchange items.
Note 2	a) The bidder shall quote the price list for O & M spares for 2 (two) years operation beyond the Defect Liability Period as recommended by manufacturers of various equipment (other than commissioning, mandatory and O&M spares required during the Defect Liability Period). b) O & M Spares required for the uninterrupted operation of the Plant during the Defect Liability period shall be considered by bidder. The cost of the spares shall be included in the scope of bidder. c) Price lists of these spares are intended for information purpose only and shall not be included in quoted Lumpsum Price

Signature & Seal of Bidder:
Date:

Annexure-[B]

DOCUMENT CATEGORY	DOCUMENT REVIEW STATUS (BY CLIENT)
(USE "X" MARK)\ ☐ APPROVAL ☐ REVIEW ☒ INFORMATION	

REV	DATE	DETAILS OF REVISION	PREPARED	CHECKED	APPROVED
0	02.11.21	ISSUED FOR INFORMATION	GCS	PK	SA

CLIENT	IndianOil INDIAN OIL CORPORATION LIMITED PARADIP REFINERY PROJECT PARADIP ODISHA
CONSULTANT	TECHNIP ENERGIES
PROJECT	525 TPD STANDBY SRU PROJECT IOCL PARADIP REFINERY, ODISHA, INDIA
ESC	ENGINEERS INDIA LIMITED

		NAME	SIGN	DATE
BHEL Hyderabad	DRN	P ARAVIND		25.02.22
	CHD	PRASHANT		25.02.22
DEPT. PE&SD. CODE 450	APPD	PC SEKHAR		25.02.22

TITLE: Specification & MTO - Fire Alarm system

BHEL DRG NO. B366-088-16-50-40250	**REV**
CUST. DRG NO. 080557C-26899053-MR-1511-004	**0**
SHT NO 1 / **NO. OF SHT 4**	

SPECIFICATION

FOR

FIRE ALARM SYSTEM

PROJECT : **STANDBY SRU PROJECT**

OWNER : **M/s INDIAN OIL CORPORATION LTD.**

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
0	02.11.2021	ISSUED FOR INFORMATION	GCS	PK	SA

1 SPECIFIC REQUIREMENTS

1.1 The interfacing of new MCPs (Break Glass Units) with existing fire alarm system shall be done through new FDAS in SRR-811.

1.2 Manual Call points(MCPs) shall have 2 sets of contacts 1 NO and 1NC. Contacts are to be rated at 24VDC @ 1A. The enclosure shall have sufficient space to accept both in line and end of line resistors. Ex-d

1.3 Each Manual Call Point shall be connected individually to FDAS PLC through digital contacts.

1.4 BGU shall be Certified as a minimum EEx'ia', IP-66, suitable for installation in outdoor location with Gas Group-IIA/IIB and Temp class T3.

1.5 Each BGU shall be supplied with one no. flameproof and weatherproof cable gland and GI canopy along with 1 no. flameproof blanking plug.

1.6 BGU enclosure & canopy shall have Fire Red color to shade 536 of IS 5.

1.7 Manual call points located in areas, not subject to flooding, shall be certified in accordance with IEC 60529.

1.8 All testing equipments required during testing and commissioning of the complete Fire Alarm System at site shall be arranged by the vendor at his own cost.

1.9 Multiple mobilizations at site for carrying out testing commissioning of Fire Alarm system, depending on the work front availability, shall be considered by the bidder.

2.0 MTO of materials to be supplied:

Ex-d

Item SR. No.	TAG NO./ITEM CODE	DESCRIPTION	Quantity
01	**BGU-HAZ**	EEx'ia' break glass type fire alarm boxes suitable for gas group IIA/IIB and temp class T3	7

3.0 Mandatory Spares

FOR MCP/BGU

S No.	Item No.	Glass for Break Glass Boxes / Manual call points
1.	BGU-HAZ IIA/IIB	5 % or min 01 no. of each type whichever is greater.

4.0 DESIGN CONDITIONS

SR. No.	CONDITION	PARADIP
1.1	Maximum/ Minimum Ambient Temperature	42.4 °C/ 11.3 °C
1.2	Design Ambient Temperature	45ºC
1.3	Relative Humidity (non-condensing)	99.7%
1.4	Soil Resistivity	As per Soil investigation report
1.5	Altitude above mean sea level	Less than 1000m above msl
1.6	Environment	Dusty, Tropical and Corrosive as found in Hydrocarbon Industry

Add-on Technical requirements

1.0 Additional requirements for instruments (if not mentioned in Annexure-[B]):

S.No.	For	Add-on requirement (to be supplied by bidder)	Qty
1	Manual Call Points	Installation Material: i) MS Steel Angle – 50 x 50 x 6thk. ii) SS 316 Hex. Head Bolt/Nut with washer – M5 x 35L iii) MS Steel Plate – 150 x 150 x 6 thk. iv) MS Steel Channel – 100 x 50 x 5 thk.	1 Set per Manual Call Point Refer Annexure – [F] for details

2.0 MANUAL CALL POINTS

2.1 Bill of material shall be as per Annexure-[A] of PY51817

2.2 Field mounted manual call points shall be fully tropicalized and all atmospheric vents fitted with bug screens where applicable.

2.3 Manual call points located in areas, not subject to flooding, shall be certified in accordance with IEC 60529, as IP 66. The housing shall be of an Industrial grade with a painted finish to the manufacturer's standard suitable for sulphurous, salt laden environmental conditions.

2.4 Manual Call points shall be provided with M20 1.5 ISO cable entries suitable for accepting cable glands.

2.5 Manual Call points shall have 2 sets of contacts 1 NO and 1NC. Contacts are to be rated at 24VDC @ 1A. The enclosure shall have sufficient space to accept both in line and end of line resistors.

2.6 Terminals shall be capable of accepting 2.5 mm2 stranded cable.

2.7 Manual call points shall be supplied with complete with associated In-line and end of line resistors fitted.

2.8 Manual Call points shall be Break Glass. Once activated the internal button will be latched and reset from the system following replacement of the glass insert.

2.9 Manual Call points are to be painted red and labelled "FIRE".

2.10 Manual Call points shall be provided with a wired on Stainless steel tag with the instrument tag number clearly engraved.

2.11 Tag numbers for Manual Call points shall be as follows:

- 088-AFMCP-0101
- 088-AFMCP-0102
- 088-AFMCP-0103
- 088-AFMCP-0104
- 088-AFMCP-0105
- 088-AFMCP-0106
- 088-AFMCP-0107

2.12 Manual Call Points and accessories shall be subjected to inspection and testing at vendor works by BHEL/Third party Inspector (TPI) and /or BHEL's customer. Test procedure shall include but not be limited to the following. All the tests being conducted shall clearly bring out in the Quality Assurance Plan (QAP) by Vendor

S.No	Test	:	Category	Reference documents
a)	Dimensional check	:	10% witness (random)	Approved drawing
b)	Material test	:	100%, Certificate review	Approved drawing
c)	BOM Verification [For Manual Call Points, glands & plugs]	:	100% witness	Manual Call Point quantity – As per P.O. Glands & plugs quantity – As per this specification
d)	Size of inlet & outlet entries	:	10% witness (random)	Approved drawing
e)	Tag plate markings	:	10% witness (random)	As per this specification
f)	Ingress protection	:	100% Type test Certificate review	As per this specification
g)	Explosion proof certificate (PESO/CCOE)	:	100% Type test Certificate review	As per enquiry material code

RECORD OF REVISIONS

Rev. No.	Date	Revision Details	Revised By	Approved By
00	11.03.2022	Original issue	----------	P Chandra Sekhar

ANNEXURE-D

6.130	BEACONS / HOOTERS/ MCP		
A	INDIAN BIDDERS		
6.130.1	BALIGA LIGHTING EQUIPMENT PVT LTD	INDIA	
6.130.2	CAEG FCG	INDIA	
6.130.3	EX PROTECTA	INDIA	
6.130.4	FLAMEPROOF EQUIPMENT PVT. LTD.	INDIA	
6.130.5	FLEXPRO ELECTRICALS PVT. LTD	INDIA	Rev.13: Name updation

5.80	CABLE GLANDS (FOR HAZARDOUS AREA)		
A	Indian Bidders		
5.80.1	Baliga Lighting Eqpts Ltd	INDIA	
5.80.2	Comet Brass Products	INDIA	
5.80.3	FCG Flameproof Control Gears Pvt. Ltd	INDIA	
5.80.4	FCG Power Ind Pvt Ltd	INDIA	
5.80.5	Flameproof Equipment Pvt. Ltd	INDIA	
5.80.6	Flexpro Electricals Pvt Ltd	INDIA	
5.80.7	KAYSONS TECHNO EQUIPMENTS PVT LTD	INDIA	Rev.16: Name updation
5.80.8	Sudhir Switchgears Pvt Ltd	INDIA	
5.80.9	R Stahl	INDIA	
5.80.10	Standard Metal Industries	INDIA	

5.59	PLUGS/SOCKETS/HANDLAMPS (FLAME PROOF)		
A	Indian Bidders		
5.59.1	Baliga Lighting Equipments (P) Limited	INDIA	
5.59.2	Cooper Crouse-Hinds	INDIA	
5.59.3	FCG Flamproof Control Gears P. Ltd	INDIA	
5.59.4	FCG Power Industries Pvt Ltd	INDIA	
5.59.5	Flameproof Equipments Pvt.Ltd	INDIA	
5.59.6	Flexpro Electricals Pvt Ltd	INDIA	
5.59.7	KAYSONS TECHNO EQUIPMENTS PVT LTD	INDIA	Rev.16: Name updation
5.59.8	PEPPERL & FUCHS MANUFACTURING (INDIA) PRIVATE LIMITED / OEM Authorised bidder: M/s. Pepperl & Fuchs (India) Pvt Ltd. – INDIA	INDIA	Rev.1: Name Change
5.59.9	Sudhir Switchgears Pvt Ltd	INDIA	

Annexure-[E]

VENDOR'S NAME & ADDRESS:	**MANUFACTURING QUALITY PLAN**		QP. NO.:	
	CUSTOMER: BHEL, HYDERABAD – 32. PROJECT: PRODUCT:	BHEL P.O.NO.: P.O.DATE: BHEL SPEC: REV:	REV NO:	DATE:
			PAGE 1 OF 1	

SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
									D	P	W	V	
1.0	**RAW MATERIALS & BOUGHT OUT ITEMS**												
2.0	**INPROCESS INSPECTION**												
3.0	**FINAL INSPECTION & TESTING**												
4.0	**PRESERVATION & PACKING**												

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL /BHEL's TPIA(BHEL NOMINATED INSPECTION AGENCY) 2 FOR VENDOR/SUB VENDOR & 3 BHEL's CUSTOMER AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY VENDOR'S SIGNATURE & STAMP	APPROVED BY BHEL QA SIGNATURE & STAMP	APPROVED BY CUSTOMER'S SIGNATURE & STAMP

GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN

1. QAP shall be made in landscape mode on A4 size paper as per the format enclosed. Font size shall be minimum 10.
2. Each page of QAP shall contain the following information.

   a) Vendor's name & address.
   b) Customer: BHEL, Hyderabad.
   c) Project.
   d) BHEL Product Standard Number/revision number as referred in P.O.
   e) BHEL Purchase Order Number & Date.
   f) Product as per P.O. description.
   g) QAP Number (unique and shall not repeat)/revision number/date.
   h) Page number and number of pages

3. QAP shall contain four parts / stages as follows.

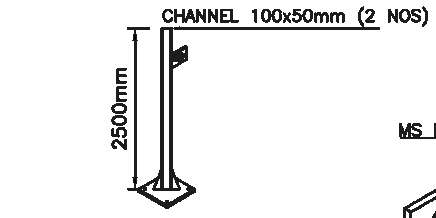
A) Raw materials and bought out items.
B) Inprocess Control / Inspection.
C) Final assembly, Inspection & Testing.
D) Painting, preservation & packing.

4. Under 'Component', indicate name of the component (say casing, rotor, pressure gauge, etc).
5. Under 'Characteristics', indicate appropriately (say chemical analysis, mechanical properties, NDT (UT,DP etc), Hydrostatic test, calibration check etc.)
6. Under 'Class', indicate minor, major or critical depending on the importance of characteristic.
7. Under 'Type of check', indicate appropriately (say chemical, mechanical, UT, DP etc.)
8. Under 'Quantum of check', indicate appropriately (say 100%, 10%, sample, per melt, per heat, all pieces etc.)
9. Under 'Reference document' and 'Acceptance norms', appropriate National & International standards, BHEL standards, approved drg references etc should be indicated. It is not correct to mention as "Vendor's internal standards or Vendor's standard practise etc". If vendors' internal standards are referred, same shall be in line with BHEL Spec. indicated in the P.O. These may require review & approval by our Engineering dept.
10. Under 'Format of record', indicate appropriately supplier's Test certificate, calibration certificate, lab report, inspection report etc.
11. Please refer 'Agency' in QAP format.
    "Under P: Perform, W: Witness, V: Verify
    Indicate against each characteristic 1: (BHEL CQS/Nominated inspection agency), OR
    2: (Vendor / Sub vendor)
    Note: Performing agency is normally vendor or his sub vendor (Legend 2). Where witness points are indicated in specification, P.O., Drawing etc., for such operations, under Witness (W) column use 1. Under 'Verify' column, use code1
12. Under 'D' please put (4 Tick) against each characteristic where vendor proposes to submit test certificate/report etc OR as required as per BHEL Spec.
13. Vendor's signature & stamp should be available on each page of QAP.

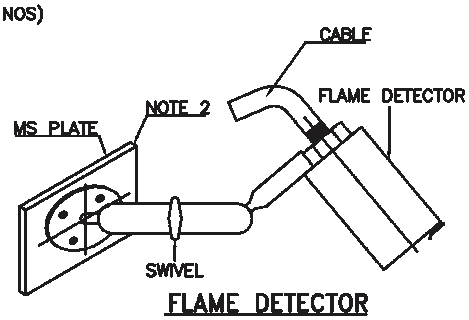
14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drgs.

15. The following operations/characteristics/check points may be included (**AS APPROPRIATE)**

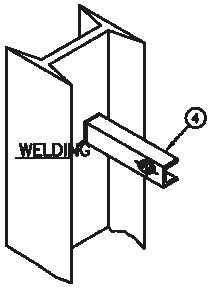
a) Visual check
b) Dimensional check
c) Mechanical and Chemical properties.
d) Surface preparation before painting (by chemical cleaning, sand blasting, shot blasting etc as the case may be.)
e) Painting check for shade, Dry Film Thickness (DFT), Adhesion/ peeloff test etc.
f) Check for correctness for all components mounted as per General arrangement Drg, Bill Of Materials (BOM), etc for range, rating, make, color, size, location as per GA, quantity, label description including tag nos., annunciator facia, loose components, accessories, spares etc.
g) Verification of test certificate for protection class for the enclosures.
h) Mechanical functioning of switches.
i) Continuity of earthing and provision of earth points.
j) Colour coding of wiring, size, tightness & dressing of wiring.
k) Review of test certificates of assembled items, raw materials, internal test reports etc.
l) Witness of functional checks, which may include mechanical run & electrical run, H.V.test, IR measurement, Electrical and Mechanical tests etc.
m) PQR, WPS, Welder Qualification Record, welding records (fitup, DP) etc.
n) Material identification (for punch marks of serial numbers, Heat No, Melt No, Inspector's stamp etc)
o) Hydraulic Pressure Test, Pneumatic Pressure Test, Liquid Penetration Examination and other Non Destructive Tests.
p) Tests on Galvanised items (Visual, Hammer Test, Knife Test, Thickness, Preece Test (Copper sulphate test), Hydrogen evaluation test, Stripping test (for Mass of Zinc coating)
q) All tests as per BHEL Product Standard & approved drawings including Type tests and Routine tests on individual items and on System as a whole.
r) Packing and Preservation.



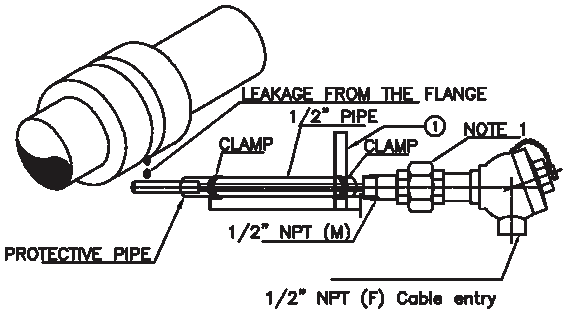
FLAME DETECTOR
OUTSIDE STEEL SCRUCTURE



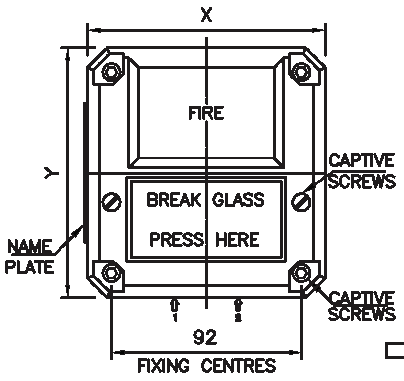
FLAME DETECTOR



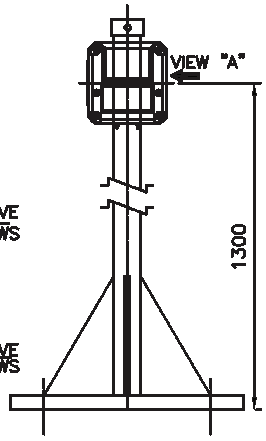
FLAME DETECTOR
(STEEL COLUMN)



SPILL DETECTOR (TEMP. DETECTEOR)



MANUAL CALL POINT



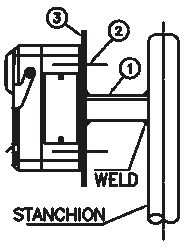
STANCHION MOUNTED

MATERIAL LIST UNIT : mm

NO.	PARTS	SIZE	MATERIAL	QUANTITY
1	STEEL ANGLE	50x50x6t	MS	
2	HEX. HEAD BOLT NUT WITH WASHER	M5x35L	SS 316	
3	STEEL PLATE	150x150x6t	MS	
4	STEEL CHANNEL	100x50x5t	MS	

NOTES:-

1) TEMP. DETECTOR (SPILL DETECTOR) TO BE CLAMPED TO THE NEAREST PIPE AT SITE. LEAKAGE FROM FLANGES CAN BE DETECTED BY TEMP. VARIATION.
2) M.S. PLATE SHALL BE WELDED TO THE STRUCTURE.



VIEW-A

STEEL MOUNTING

OWNER
IndianOil
TechnipFMC

PROJECT: STANDBY SRU & ADDITIONAL TANKS
IOCL PARADIP REFINERY, ODISHA, INDIA

CLIENT: INDIAN OIL CORPORATION LTD.

INSTALLATION OF FLAME DETECTOR, SPILL DETECTOR & MANUAL CALL POINT

DRAWING NO.						PAGE	REV.
SCALE	080557C	000	STC	1590	003	34 OF 42	A
NTS	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.		

TechnipFMC / IndianOil	PROJECT	Standby SRU & Additional Tanks IOCL Paradip Refinery	
	CLIENT	INDIAN OIL CORPORATION LIMITED	
INSPECTION AND TEST PLAN FOR INSTRUMENTATION	**Project No.** 080557C001	**Document No.** 080557C-000-ITP-1500-001	**Rev. No.** B	Page 1 of 17

INSPECTION AND TEST PLAN FOR INSTRUMENTATION

			Written By: Govindaraj Subramanian-External 2019.12.11 17:35:44 +05'30'	Checked By: Mathivanan Ganesan 2019.12.12 14:34:19 +05'30'	Approved By: Sriram Sankaranarayanan 2019.12.13 11:38:33 +05'30'	Authorized By: Morischristopher Jesumarian 2019.12.13 19:53:36 +05'30'
B	10.12.2019	ISSUED FOR QUOTATION	SGR	GM	SS	JMC
A	11.10.2019	ISSUED FOR QUOTATION	SGR	GM	SS	JMC
REV.	**DATE**	**DESCRIPTION**	**PREPARED**	**CHECKED**	**APPROVED**	**AUTHORIZED**

CONTENTS

1. INTRODUCTION

INDIAN OIL CORPORATION LIMITED (IOCL) has awarded Fax of Acceptance (FOA) dated 29th August 2019 to M/s. Technip India Limited (TPIL) for Consultancy services (PMC/EPCM services) for overall project management, FEED Review / FEED, Detailed Engineering, Procurement & expediting services, Tendering & award, Construction Management & Supervision, Assistance in start-up, Commissioning & performance test runs for installation of a Standby SRU of 525 TPD capacity and execution of Additional tanks for Paradip Refinery, Odisha, India.

2. SCOPE

This specification intends to define the minimum technical requirements for Inspection and Test requirement for Instrumentation. However, Contractor / Manufacturer shall develop and submit the detailed QAP / ITP with additional scope requirement inline with technical specifications / drawings / datasheets / relevent codes and standards for PMC/Owner approval. Any other instrumentation item not catagorized here shall be separately categorized.

3. GENERAL ABBREVIATIONS

Abbreviation	Definition /Expanded form
IOCL/ CLIENT	Indian Oil Corporation Limited
PMC/ CONSULTANT	Technip India Limited
LICENSOR	Party selected by IOCL for process technology ownership for any UNIT
CONTRACTOR	Party whose services are obtained for performing the works specified as part of LSTK / packages.
EPCM	Engineering, Procurement & Construction Management Services.
LSTK	Lump Sum Turn Key portion of the work to be executed by CONTRACTOR
FEED	Front End Engineering Design
AUTHORISED REPRESENTATIVE	IOCL's/ CONSULTANT's representative authorized to act for and on behalf of them.
VENDOR	Any third party supplying the equipment/materials for setting up the Plant
PROJECT	Indicates Standby SRU and Additional tanks Project, Paradip Refinery
UNIT	Indicates any particular portion of the project to be built which can be Process related or Utilities/Offsites related
SRU	Sulphur Recovery Unit

4. TECHNICAL ABBREVIATIONS

BIS	Bureau of Indian Society
CMRI	Central Mining Research Institute
CCOE	Chief Controller Of Explosives
ERTL	Electronics Regional Test Laboratory
FF	Foundation Fieldbus
FAT	Factory Acceptance Test
HART	Highway Addressable Remote Transducer
NACE	National Institute of Chemical Engineers
N.D.E	Non Destructive Examination
NDT	Non Destructive Testing
PESO	Petroleum and Explosives Safety Organisation
WPS	Welding Procedure Specification
PQR	Procedure Qualification Record
WPQ	Welder Performance Qualification

5. CONFLICTS AND DEVIATIONS

The codes standards and guides issued by the organizations listed below should be considered as source of guidance in Instrumentation & Control system and not limited to the following. Applicable national / international standards Design and terminology shall comply, as a minimum, with the latest edition of following codes standard practices and publications. Any statutory and regularity requirement shall be fully complied.

If conflicting statements exist within this document or between this document and Design Basis, other applicable specifications, Standard Drawings, Industry standards, codes, etc., it shall be brought to Owner's / PMC notice for clarification and proper approval shall be obtained before implementation. Decision of Owner / PMC shall be final.

In case of contradiction between licensor specification and this document and Job specificaiton. It has to be brought to the notice of PMC/Owner.

In general, order of priority of the documents shall be as follows,

- Local regulatory and statutory requirement.
- Licensor Requirements (as applicable)
- Project specification and datasheets, wherever applicable.
- This specification and relevant equipment/system specification.
- Codes and standard.

6. REFERENCE NATIONAL / INTERNATIONAL STANDARDS

Refer below document for Codes and standards.

AERB	Atomic Energy Regulatory Board
CCOE	Chief Controller of Explosives
DGMS	Director General of Mines Safety
PESO	Petroleum and Explosives Safety Organisation

UPCB	Uttar Pradesh Pollution Control Board
ASME 31.3	Process Piping Guide
ASME B 16.34	Valves-Flanged,Threaded and Welding End
API STD 527	Seat Tightness of Pressure Relief Valves
API 598	Valve Inspection and Testing
BS EN 10204	Metallic products Types of Inspection Documents
ANSI / FCI 70-2	Control Valve Seat Leakage
ASME Sec IX	Welding and Brazing Qualification
ASME Sec V	Non Destructive Examination
ASME Sec VIII Div 1	Rules for Construction of Pressure Vessel
NACE MR0103	Petroleum, Petrochemical and Natural gas Industries-Metallic materials resistant to Sulphide Stress cracking in corrosive Petroleum refining environments
NACE MR0175/ ISO 15156	Petroleum, Petrochemical and Natural gas Industries-Material for Use in H2S-containing environments in Oil and Gas Production
ISO 5208	Industrial valves-Pressure testing of metallic valves
IEC- 540 & 540A	Test methods for insulation and sheaths of electric Cables
IEC-60331	Testing of Fire Resistant cables.
IEC-60332	Tests on bunched wires and cables.
IEC-794-1-E4/E7	Impact strength cable twist test.
IEC-794-1-F5	Water Penetration test
IEC-794-1-F1	Cable Temperature Cycling Test

IS-10810 Method of test for cables.

- Part 40 Method for testing uniformity of coating on zinc coated articles.
- Part 41 Mass of zinc coating on steel armour
- Part 58 Oxygen Index test
- Part 59 Determination of halogen acid gas evolved during combustion of polymeric material taken from cables
- Part 61 Flame Retardant test
- Part 62 Flame Retardance test for bunched cables
- Part 63 Smoke density of electric cables under fire conditions.

7. REFERENCE DOCUMENTS

This document along with following documents shall be considered as basic guide for overall design of plant instrumentation of new projects.

080557C -000-JSD-1540-001	Design Basis - Instrumentation

080557C-000-JSD-1540-002	Control & Safety system design criteria
080557C-000-JSS-1574-001	Job Specification for Instrument Cables
080557C-000-JSS-1541-001	Job Specification for Control Valves
080557C-000-JSS-1543-001	Job Specification for On-Off Valves / MOV
080557C-000-JSS-1545-001	Job Specification for Safety Valves
080557C-000-JSS-1560-001	Job Specification for Analysers and Analyser Shelters
080557C-000-JSS-1566-001	Job Specification for Gas detectors
080557C-000-JSS-1566-002	Job Specification for Fire detectors
080557C-000-JSS-1553-001	Job Specification for Electronic Field Transmitter
080557C-000-JSS-1546-001	Job Specifications for Flow Elements
080557C-000-JSS-1547-001	Job Specifications for Flow Instruments
080557C-000-JSS-1547-006	Job Specifications for Coriolis mass flow meters
080557C-000-JSS-1547-007	Job Specifications for Ultrasonic flow meters
080557C-000-JSS-1552-007	Job Specifications for Special Type Level Instruments
080557C-000-JSS-1591-001	Specification of Cable Trays and Ducts
080557C-000-JSD-1300-002	Piping Material Specification
080557C-000-JSD-2300-001	Standard specification for Painting & Coating
080557C-000-JSS-6300-002	Positive Material Identification at Manufacturer's works

8. INSPECTION AND TEST REQUIREMENTS:-

8.1 General

8.1.1 The Manufacturer/Contractor must issue a Fabrication and Quality Control Plan for each equipment.

8.1.2 The Manufacturer/Contractor's Fabrication and Quality Control Plan is a document which defines in a chronological manner the list of the operations of fabrication, controls and tests in accordance with his own "know-how" and with the requirements specified in Material Requisition.

8.1.3 Following information shall be clearly specified against each operation:

- Reference documents (drawings, procedures, etc.)
- Acceptance criteria (code, etc.)
- Recording documents for controls and tests
- Involvement of the Quality Control department of the Contractor and/or his Sub-contractor

8.1.4 All instruments and system-oriented items shall undergo factory testing and inspection by authorized Third party representatives (TPIA) / Contractor unless specified otherwise.

8.1.5 The inspection and testing shall be carried out as per related specifications, international codes and practices/standards, approved documents and/or any other documents attached along with specifically suggesting testing to be carried out at Contractor's / TPIA works. This is the general guideline which shall give minimum requirement for inspection and testing. However it is contractor responsibility to add inspection and test as per Industry practice, codes and standards.

8.1.6 Items, for which 'Witness Inspection' is specifically exempted, Manufacturer / Contractor shall forward the test certificates as desired for review. The material shall be despatched only after obtaining written despatch clearance.

8.1.7 No system or system oriented item shall be despatched without integrated factory testing witnessed by representatives of Third party inspector / Contractor. The testing procedures shall be detailed out, based on testing requirements indicated in individual system specifications

8.1.8 Testing and inspection for all items shall be carried out as per Owner/PMC approved factory testing procedures.

8.1.9 Performance specifications must be detailed out on each item which shall be verified by third party agency / by Contractor during factory testing.

8.1.10 Acceptable criteria for Radiography and other NDT requirements for the instruments / instrument castings shall be inline with those specified in 'Piping Specifications' have been attached elsewhere in this package.

8.1.11 IBR certifications shall be provided in the appropriate format duly signed by IBR authority or their authorised agency. Form IIIC shall be submitted.

8.1.12 Verification of setpoint of rupture disc shall be part of witness inspection. Testing shall be carried out on the rupture disc, which are part of the actual rupture disc batch of Contract. This shall be in addition to the 3 numbers of spare rupture discs already indicated in the requirements. The testing, in general, shall be as per ASME section VIII Division 1.

8.1.13 Inspection and test items, witness inspection items for various kind of instrument at FAT (Factory acceptance test) shall be as shown in **Table A.**

8.1.14 Inspection Release Certificate shall be issued by CONTRACTOR, permits the Vendor to proceed with the packing and to notify the shipment

8.2 Visual Inspection

8.2.1 Confirmation items

1. Type and model
2. Tag no.
3. Rating
4. Range, Scale and symbol of unit
5. Set pressure and capacity of safety valves
6. Valve characteristics and CV value of control valves
7. Name of materials
8. Nameplate details
9. Colour of painting
10. Die Marking (nominal size, material of flange and direction of flow)
11. Accessories
12. Quantity

8.2.2 Harmful defects

- Defect such as cracks, deformation and flaws shall not be found in the casting, forging and machined surface of the pressure rating part.
- Defect such as inside surface weld protrusion; lack of fusion and incomplete penetration shall not be found in welded places of pressure retaining part.

8.2.3 The instrument shall be in rugged design and assembly of all components within the enclosure fixed firmly to avoid loosening or falling-off of any parts.

8.2.4 Painting shall be done inline with painting scheme. Painting of instrument's surface shall be such that there is no defect or lack of uniformity.

8.3 Dimensional Inspection

[X] Main parts
[X] Flange to Flange Dimesnions (Valves, Level gauges, Displacer Level Inst, Flow Inst)
[X] Actuator Dimesions.

Check and confirm to the requirement of Specification, approved drawings or applicable code and standards.

8.4 Material Inspection

8.4.1 Mill test certificates

Contractor shall submit the mill test certificates complying to EN 10204 type 3.1 for all pressure parts

Mill Test certificates shall be submiited complying to EN 10204 type 3.1 for following Instrument parts and not limited to

I.	Temperature Instruments	: **[X]** Flange and Thermowell
II.	Displacement type liquid level meter	: **[X]** Chamber and Flange
III.	Glass Gauge , Magnetic LG	: **[X]** Body and Flange
IV.	Transmitter Diaphragm	: **[X]** Body and Flange
V.	PG/DPG	: **[X]** Body and Flange
VI.	Condensate pot	: **[X]** Body
VII.	Gas eliminator	: **[X]** Body
VIII.	Gaskets	: **[X]** Body
IX.	Fasteners	: **[X]** Studs, Nuts, washers etc.
X.	Springs	: **[X]** Body
XI.	Electrical & Instrumentation Items	: **[X]** Body

8.5 Non-Destructive Examination & Heat Treatment

1. Control valve, On-Off valve and safety valve
   Following Par. 8.5.2 and 8.5.3

2. Other instruments
   Shall be carried out in accordance with Manufacturer/Contractor's standards.

8.5.1 Ultrasonic Examination

1 Forging material on Orifice flange and Flow nozzle
[X] ANSI class 900 or above

8.5.2 Radiography Examination

[x] The pressure retaining parts

1. Applicable material and quantity

- Welded parts : **[ ]** JIS Z 3104, Z 3106
  [X] As per Piping Material Specifications / ASTM – ASME 31.3

2. Acceptant standards and grade

- Casting : [ ] JIS G 0581
  [X] As per ASME B 16.34

8.5.3 Magnetic Particle or Liquid Penetrant Examination shall be carried out in accordance with Piping Material Specifications.

8.5.4 Preheat/Post Heat weld treatment shall be provided for welds, as per piping material specification.

8.5.5 Manufacturer / Contractor shall submit the WPS/PQR/WPQ for all welding activities as per ASME sec IX for PMC/Owner approval.

8.5.6 Preheat/Post Heat weld treatment shall be provided for welds, as per piping material specification.

8.6 Pressure Test

8.6.1 Control and On-Off Valves

1. Body and Bonnets

   [X] Hydrostatic test shall be as per ANSI/ISA-75.19.01

2. Body of special type

   [X] Hydrostatic test

   Test pressure and Hold time.

   [X] Hydrostatic test shall be as per ANSI/ISA-75.19.01
   [X] Minimum 5 minutes.

   Permanent distortion or Leakage

[X] shall not be found

8.6.2 Safety Valve or Safety Relief Valve

1. Pressure retaining parts test shall as per ASME (Sec I and Sec VIII) as applicable.

[X] Hydrostatic test before assembling
i. Test pressure and Hold time.

[X] 1.5 times of Design Pressure / min. 2 kgf/cm2g.
[ ] 2.2 times of Design Pressure.
[X] Minimum 5 minutes.

ii Distortion or leakage
[X] shall not be found

2. The out side parts of enclosed type

[X] Hydrostatic test after assembling

i. Test pressure and Hold time
[X] 1.5 times. Design Pressure of flange
[ ] 2.2 times. Design Pressure of flange
[X] Minimum 5 minutes.

ii. Defects
[X] Shall not be found

3. Special type valves

[X] Hydrostatic test with the Manufacturer's standards approved by PMC/Owner, where Par. 8.6.2(1) and (2) are not applicable

8.6.3 The pressure retaining parts of instrument

[X] Hydrostatic test or Pneumatic test as per applicable codes and standard

i Test pressure and Hold time
[X] 1.5 time of Max. Design pressure / Min. 2 kg/cm2g
[X] Min. 5 minutes

ii Permanent distortion or Leakage
[X] Shall not be found

If the above mentioned test is technically difficult, the test shall be carried out in accordance with the Manufacturer's standards approved by PMC/Owner.

8.7 Pneumatic Test

8.7.1 The pneumatic test for instrument

i Test pressure & Hold time
[X] Max. Design Pressure. (Design press.)
[X] Minimum 5 minutes

ii Permanent distortion or Leakage
[X] Shall not be found

8.8 Seat Leakage Test

8.8.1 Control Valve
Allowable leakage valve / (code): **[X]** ANSI B16.104 (FCI 70-2)

8.8.2 Safety valve
Allowable leakage valve / (code): **[X]** API 527

8.9 Performance Test

For each instruments, the performance test shall be carried out in accordance with procedure approved by Owner / PMC, as a minimum as per specification.
Acceptance standard shall be in accordance with applicable codes & standard, specification, and / or manufacture's standard approved by Own / PMC as a minmum as per specification.

8.10 Insulation Resistance Test

1. Power supply circuit & alarm circuit : 10M Ω or over (instrument panel: 3 MΩ or over/each panel)
2. Signal circuit : 5M Ω or more (instrument panel: 3 MΩ or More per panel)

The test shall be carried out in accordance with the applicable codes & Standards. Due to any technical constraint to measure, this test can be omitted

8.11 High-voltage Test

1. A-C power supply and alarm circuits

   i. Voltage level less than 250 V : **[X]** A-C 1500 V

   ii. Voltage level 250 V and above : **[X]** A-C 2E + 1000V

   'E' is the rated voltage.

2. D-C power supply circuits : **[X]** D-C 500V

   Test can be omitted in case of any technical constraint.

8.12 PMI Requirements:

PMI shall be performed for alloy metal as per approved Positive Material Identification Procedure.

8.13 Sour and HIC service / NACE Requirements

In case of Sour and HIC service, the instruments materials must meet the specific requirements hardness, radiography and other testing requirements, as per NACE MR-0103 latest edition.

8.14 Hydrogen Service Requirement

For Instruments used in Hydrogen Service, it must be certified for the use in Hydrogen service, specifically Hydrogen diffusion problems. Reference list, along-with performance feedback shall be furnished.

For hydrogen service the instruments shall meet all the material and testing requirements such as Helium leak test etc.

8.15 Indian Boiler Regulation (IBR) Requirement

For applications involving Steam, the manufacturer must furnish the IBR form IIIC certification duly approved by IBR authority tested and certified by IBR. All IBR approved drawings and certificates shall be submitted to owner through PMC.

8.16 Metering systems Requirement

For metering application, contractor shall meet the national Weights & measures codes and regulations control requirement.

8.17 Nuclonic Instruments Requirement

For Nucleonic Instruments, it shall be reviewed and approved by AERB (Atomic Energy Regulatory Board)

8.18 P, H, R, W definaion

H: (Hold) Point

The Manufacturer cannot carry out the specified controls and tests without Inspector attendance. Consequently, the attendance to witnessing is mandatory. The Manufacturer must notify Contractor/PMC/OWNER by email of the dedicated inspection activity at least fifteen (15) days in advance.
The Manufacturer cannot deviate from this rule unless written approval has been given by involved operating center.

W: (Witness)

The Manufacturer must notify to Contractor/PMC/OWNER of the dedicated inspection activity at least fifteen (15) days in advance. OWNER witnessing is not mandatory, but optional. When a percentage value is indicated (i.e. W 10%) the inspection activities will be witnessed on spot

basis as per percentage indicated.

If Owner do not elect to be present, the Manufacturer/Contractor may proceed with his own inspection, provided controls and tests records are made available to Inspector for review.

R: (Review) - Review of Documents

The Manufacturer/Contractor has either to submit to Inspector for comments the documents required prior to the performance of the dedicated activity or to transmit or make available for the review of Inspector the results of the controls and tests conducted, as the case may be.

P (Perform)

The Manufacturer/Contractor/ Third Party Agency has to perform 100% internal testing of the instruments, and submit the internal test report to PMC/Owner

I Information

The Manufacturer/Contractor/ Third Party Agency has to perform 100% internal testing of the instruments, and provide the MTCs and test reports to PMC/Owner for information

Note (*) – For all sub ordered strainless steel, alloy steel forgings and carbon steel forgings of rating more than 300#, testing shall be witnessed by Contractor/Third Party Agency at sub-suppliers works

Table A : Table of Inspection and Test Items

Kind of Instrument	Inspection and Test Items											
	Visual Inspection	Dimensional insp.	Material insp.	Non-destructive exam	Pressure test	Pneumatic test	PMI test, if applicable	Performance test	Insulation resistance test	High voltage test	Steam test	MDRB (Documention)
1 Thermocouple	P / W	P / W	—	—	—	—	—	P / W	—	—	—	H
2 Resistance thermometer bulb	P / W	P / W	—	—	—	—	—	R	—	—	—	H
3 Compensating lead wire	P / W	P / W	—	—	—	—	—	R/W	—	—	—	H
4 Bimetallic thermometer	P / W	P / W	—	—	—	—	—	R	—	—	—	H
5 Gas or liquid-filled thermometer	P / W	P / W	—	—	—	—	—	R	—	—	—	H

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	Visual Inspection	Dimensional insp.	Material insp.	Non-destructive exam	Pressure test	Pneumatic test	PMI test, if applicable	Performance test	Insulation resistance test	High voltage test	Steam test	MDRB (Documention)
6 Multipoint temp Element	P / W	P / W	—	—	—	—	—	R	—	—	—	H
7 Skin type T/C	P / W	P / W	—	—	—	—	—	R	—	—	—	H
8 Thermowell	P / W	P / W	R	R	R	—	W	—	—	—	—	H
9 Differential pressure flow meter	P / W	P / W	—	—	R	—	—	R	—	—	—	H
10 Differential pressure transmitter	P / W	P / W	—	—	R	—	—	R	—	—	—	H
11 Bourdon gauge	P / W	P / W	—	—	R	—	—	R	—	—	—	H
12 Draft gauge	P / W	P / W	—	—	R	—	—	R	—	—	—	H
13 Differential pressure gauge	P / W	P / W	—	—	R	—	—	R	—	—	—	H
14 Pressure transmitter / switch	P / W	P / W	—	—	R	—	—	R	—	—	—	H
15 Displacement type level indicator, controller	P/W/ R/H	P/W/ R/H	R	R	P/W/ R/H	—	W	P/W/ R/H	P/W/R	P/W/ R	—	H
16 Chamber for displacement type level meter	P/W/ R/H	P/W/ R/H	R	R	P/W/ R/H	—	W	—	—	—	—	H
17 Glass gauge	P / W	P/W/ R	R	R	P/R	—	—	—	—	—	—	H
18 Magnetic Level gauge	P / W	P/W/ R	R	R	P/W/ R	—	W	—	—	—	—	H
19 Float type level meter,	P/W/ R	P/W/ R	P/W/R	R	R	—	—	P/W/ R	P/W/R	P/W/ R	—	H
20 Differential pressure type level meter	P/W/ R	P/W/ R	P/W/R	—	R	—	—	P/W/ R	P/W/R	P/W/ R	—	H
21 Purge type level meter	P/W/ R	P/W/ R	—	—	—	—	—	P/W/ R	—	—	—	H

Kind of Instrument	Inspection and Test Items											
	Visual Inspection	Dimensional insp.	Material insp.	Non-destructive exam	Pressure test	Pneumatic test	PMI test, if applicable	Performance test	Insulation resistance test	High voltage test	Steam test	MDRB (Documention)
22 Radar / Ultrasonic / Servo type level meter	P/W/ R/H	P/W/ R/H	P/W/R	—	—	—	—	P/W/ R/H	P/W/R	P/W/ R	—	H
23 Capacitance type level meter	P/W/ R/H	P/W/ R/H	P/W/R /H	—	—	—	—	P/W/ R/H	P/W/R	P/W/ R	—	H
24 Conductivity type level meter	P/W/ R/H	P/W/ R/H	P/W/H	—	—	—	—	P/W/ R/H	P/W/R	P/W/ R	—	H
25 Instrument panel	P/W/ R/H	P/W/ R/H	—	—	H	H	—	P/W/ R	P/W/R	P/W/ R	—	H
26 Instrument desk	P/W/ R/H	P/W/ R/H	—	—	—	—	—	P/W/ R/H	P/W/R	P/W/ R	—	H
27 Gauge board	P/W/ R	P/W/ R	—	—	H	H	—	P/W/ R/H	P/W/R	P/W/ R	—	H
28 Gas chromato-graph	P/W/ R	P/W	—	—	—	P/W/ R	—	P/W/ R/H	P/W/R	P/W/ R	—	H
29 Mass spectro-meter	P/W	P/W	—	—	—	P/W/ R	—	P/W/ R/H	P/W/R	P/W/ R	—	H
30 Infrared type gas analyzer	P/W	P/W	—	—	—	P/W/ R	—	P/W/ R/H	P/W/R	P/W/ R	—	H
31 Magnetic type gas analyzer	P/W	P/W	—	—	—	P/W/ R		P/W/ R/H	P/W/R	P/W/ R	—	H
32 Thermal conductivity type analyzer	P/W	P/W	—	—	—	P/W/ R	—	P/W/ R/H	P/W/R	P/W/ R	—	H
33 Combustion type gas analyzer	P/W	P/W/ R	—	—	—	P/W/ R	—	P/W/ R/H	P/W/R	P/W/ R	—	H
34 Density type gas analyzer	P/W	P/W	—	—	—	—	—	P/W/ R	P/W/R	P/W/ R	—	H
35 Photo-electric type analyzer	P/W	P/W	—	—	—	—	—	P/W/ R	P/W/R	P/W/ R	—	H
36 RVP Analyser	P/W	P/W	—	—	—	—	—	P/W/ R	P/W/R	P/W/ R	—	H
37 Moisture analyzer	P/W	P/W	—	—	—	—	—	P/W/ R	P/W/R	P/W/ R	—	H
38 pH meter	P/W	P/W	—	—	—	—	—	P/W/ R	P/W/R	P/W/ R	—	H

Kind of Instrument	Inspection and Test Items											
	Visual Inspection	Dimensional insp.	Material insp.	Non-destructive exam	Pressure test	Pneumatic test	PMI test, if applicable	Performance test	Insulation resistance test	High voltage test	Steam test	MDRB (Documention)
39 Turbidity analyzer Water quality analyzer	P/W	P/W	—	—	P/W/R	—	—	P/W/R	P/W/R	P/W/R	—	H
40 Density meter	P/W	P/W	—	—	P/W/R	—	—	P/W/R	P/W/R	P/W/R	—	H
41 Conductivity meter	P/W	P/W	—	—	P/W/R	—	—	P/W/R	P/W/R	P/W/R	—	H
42 Flame detector	P/W	P/W	—	—	—	—	—	P/W/R	P/W/R	P/W/R	—	H
43 Gas detector	P/W	P/W	—	—	—	—	—	P/W/R	P/W/R	P/W/R	—	H
44 Manual Call Point	P/W	P/W	P/W/R	—	—	—	—	P/W/R	—	—	—	H
45 Nuclonic Instruments	P/W	P/W	—	—	—	P/W/R	—	P/W/R	P/W/R	P/W/R	—	H
46 Sounder / Beacon	P/W	P/W	P/W/R	—	—	—	—	P/W/R	—	—	—	H
47 Cables	P/W	P/W	P/W/R	—	—	—	—	P/W/R	—	—	—	H
48 Junction Box / Gland	P/W	P/W	P/W/R	—	—	—	—		—	—	—	H
49 Cable Tray / Duct	P/W	P/W	P/W/R	—	—	—	—		—	—	—	H
50 Tube and Fittings	P/W	P/W	P/W/R	—	—	—	—		—	—	—	H

9. NOTES:

1. Type test Certificates for Fire safety test of valves shall be submitted before order for approval.
2. Helium or Equivalent Leak test shall be performed for Welding on case to case basis
3. Surface preparation and painting shall be done for each type of material i.e. CS, LTCS, SS, Super Duplex etc. in accordance with Painting Scheme.
4. Selection of material shall be as per piping material specifications.
5. In case of any conflict only stringent references and acceptances, standards & codes shall be applicable.
6. Tests for painting shall be done as per painting specifications.

7. For cryogenic service selection of paint system shall be approved by PMC/OWNER

8. Owner may take raw material sample randomly during manufacturing to confirm specification requirement, if material found not complying with requirement then client will have authority to reject the all relevant item regardless of any progress stage of relevant item.

9. Procurements shall be done directly from manufacturer by Contractor, purchase through traders will only be entertained in case of imported material only.

10. Manufacturer/Contractor shall submit the internal test reports, type test reports, statutory approval certificates to PMC/OWNER for review/information.